NATURAL GAS

# Energy that Inspires

Jim Hearing, director, operations standardization

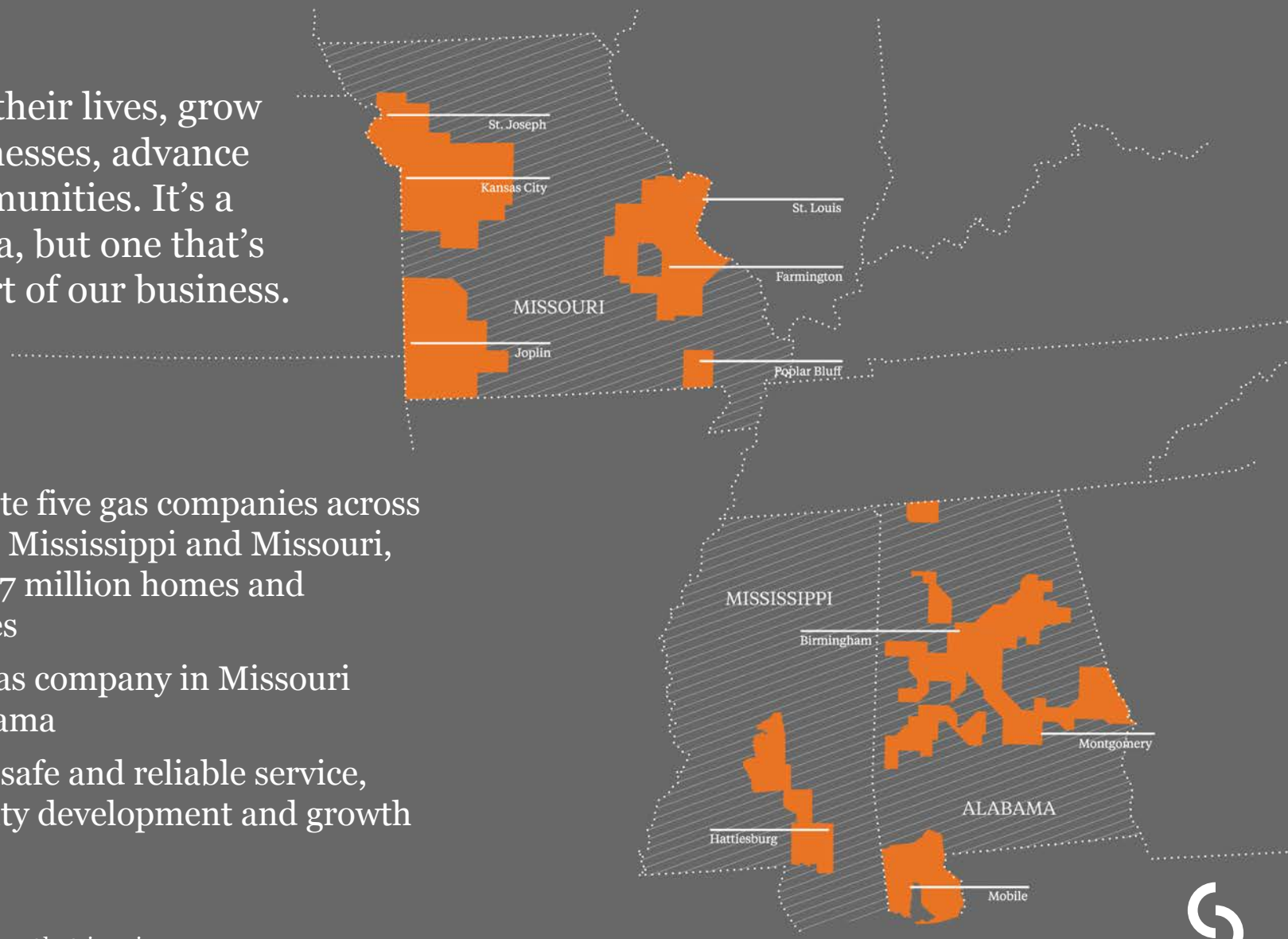
Southern States Energy Board

July 21, 2018

spire SM

# We believe energy exists to help people.

To enrich their lives, grow their businesses, advance their communities. It's a simple idea, but one that's at the heart of our business.



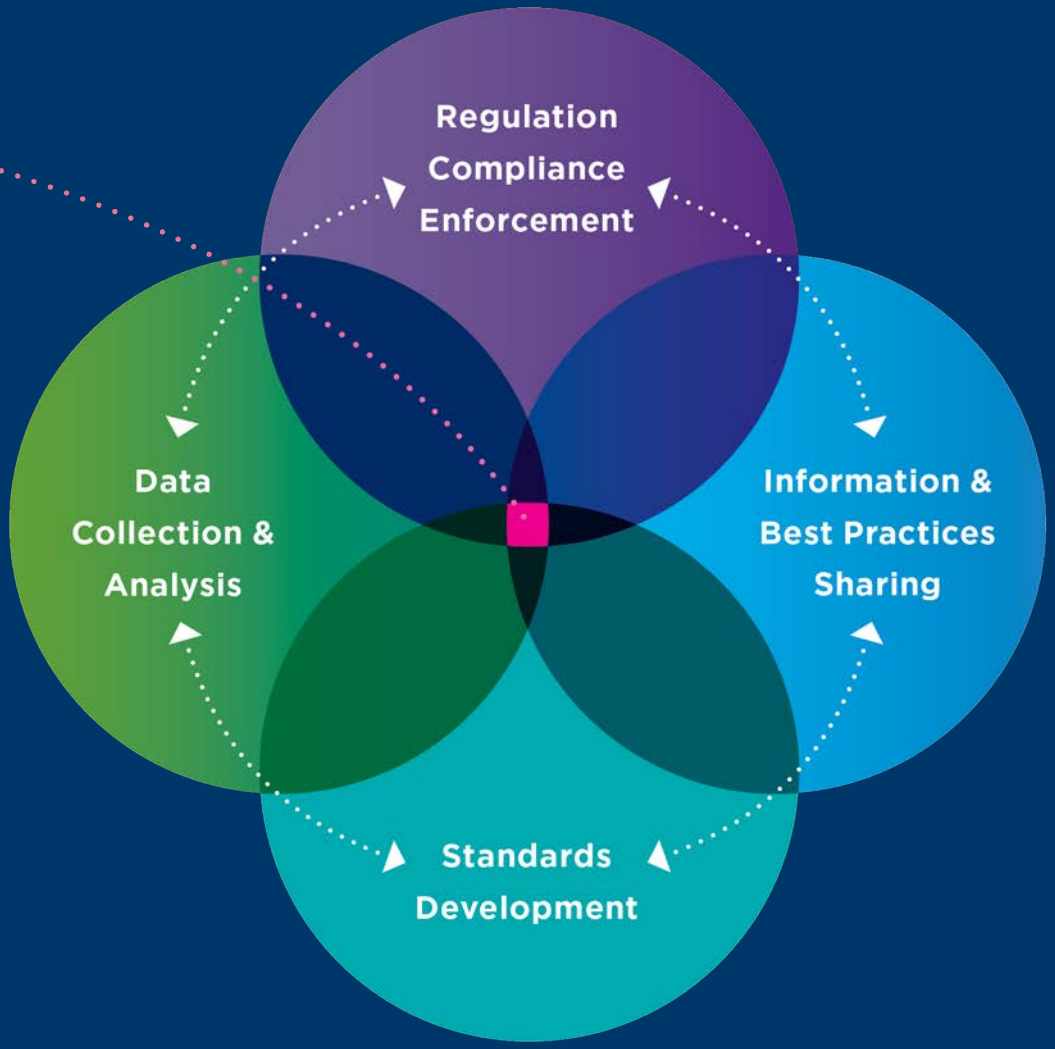

- We operate five gas companies across Alabama, Mississippi and Missouri, serving 1.7 million homes and businesses
- Largest gas company in Missouri and Alabama
- Focus on safe and reliable service, community development and growth

# Safe & reliable

Safety is the core value for the natural gas distribution and transmission industry.

# Safest energy-delivery system in America

The natural gas industry has a long-standing record of providing natural gas service safely and effectively to more than 177 million Americans and is dedicated to the continued enhancement of pipeline safety.



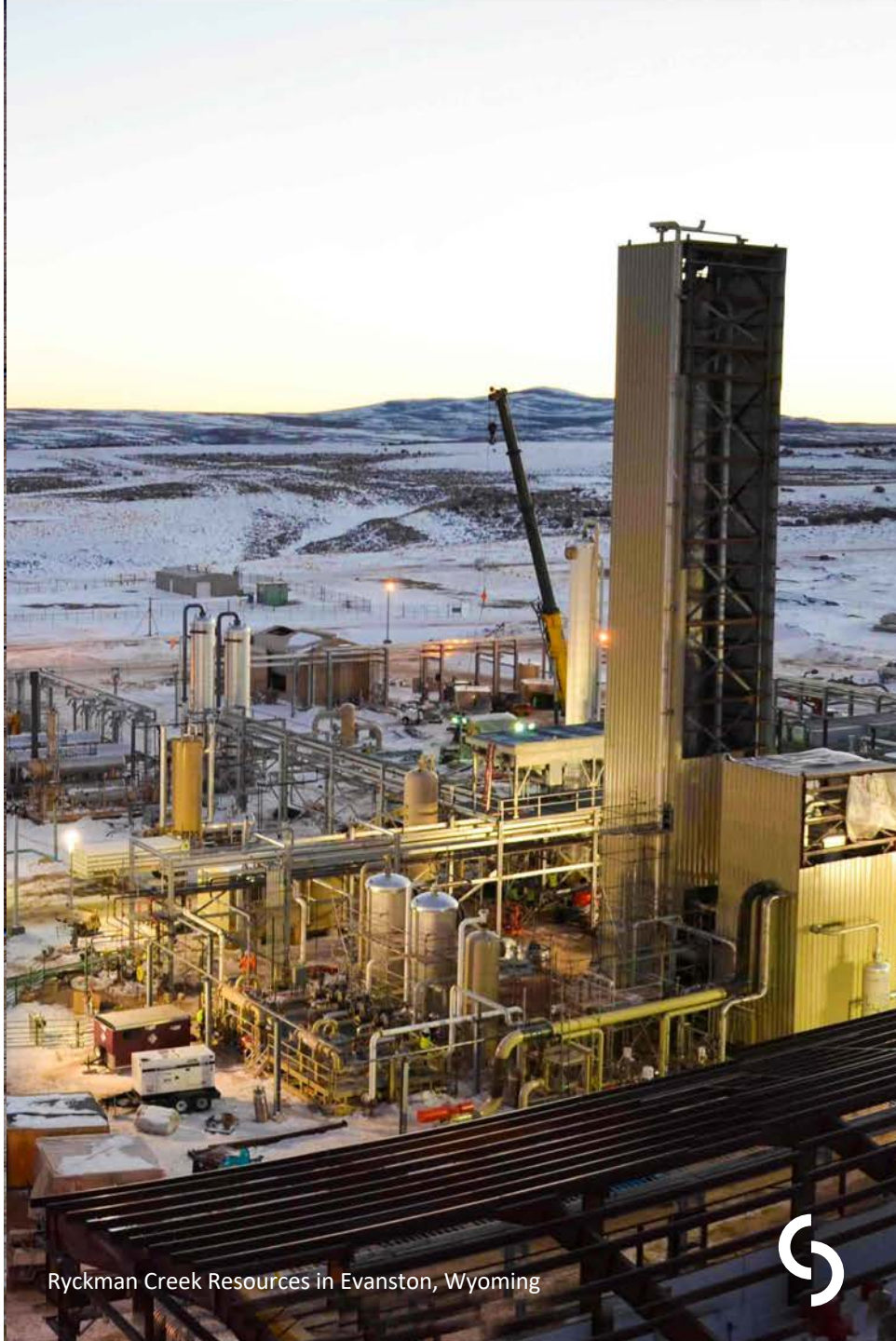
# Pipelines bring opportunity

- There are pockets of this country that do not have access to natural gas.
- Gas utilities are working with energy planners, regulators and policymakers to bring natural gas — and the comfort and savings it delivers — to these new customers.


*An interstate natural gas pipeline construction or expansion project takes an average of about **three years** from the time it is first announced until the new pipe is placed in service.*

# Investing in pipelines and storage

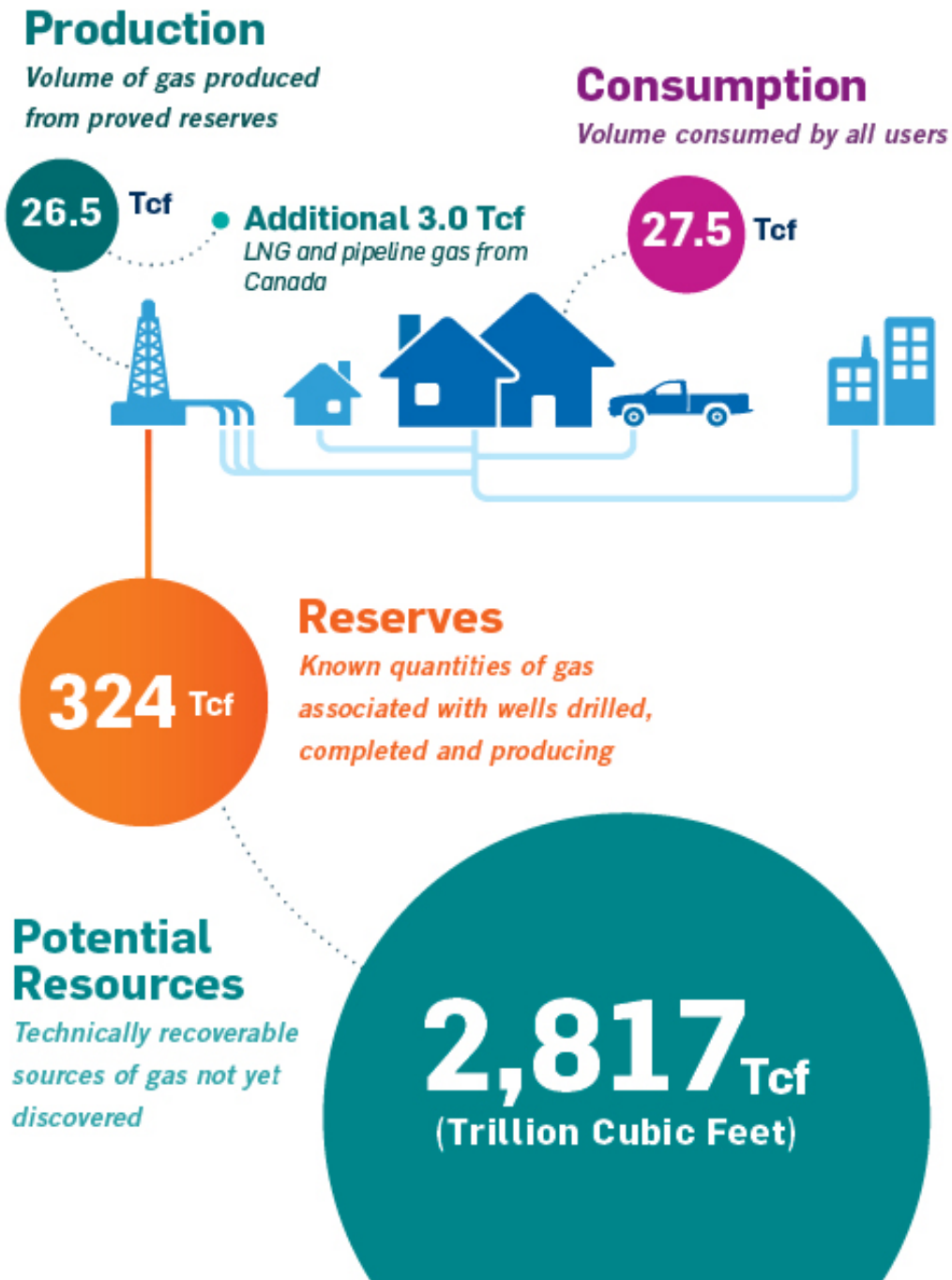
- Progressing on Spire STL Pipeline
  - Targeting 2019 in-service date and investment of $190 - $210 million
- Integration of newly acquired storage facility well underway
  - Enhancing operating performance and investing to expand capacity



Ryckman Creek Resources in Evanston, Wyoming

# And then there was abundance

The estimated future supply of natural gas (reserves plus resources) in the U.S. stood at 3,141 Tcf at year-end 2016 — enough natural gas to meet America's diverse energy needs for more than 100 years. The estimated future supply more than doubled for the period 1990-2016.

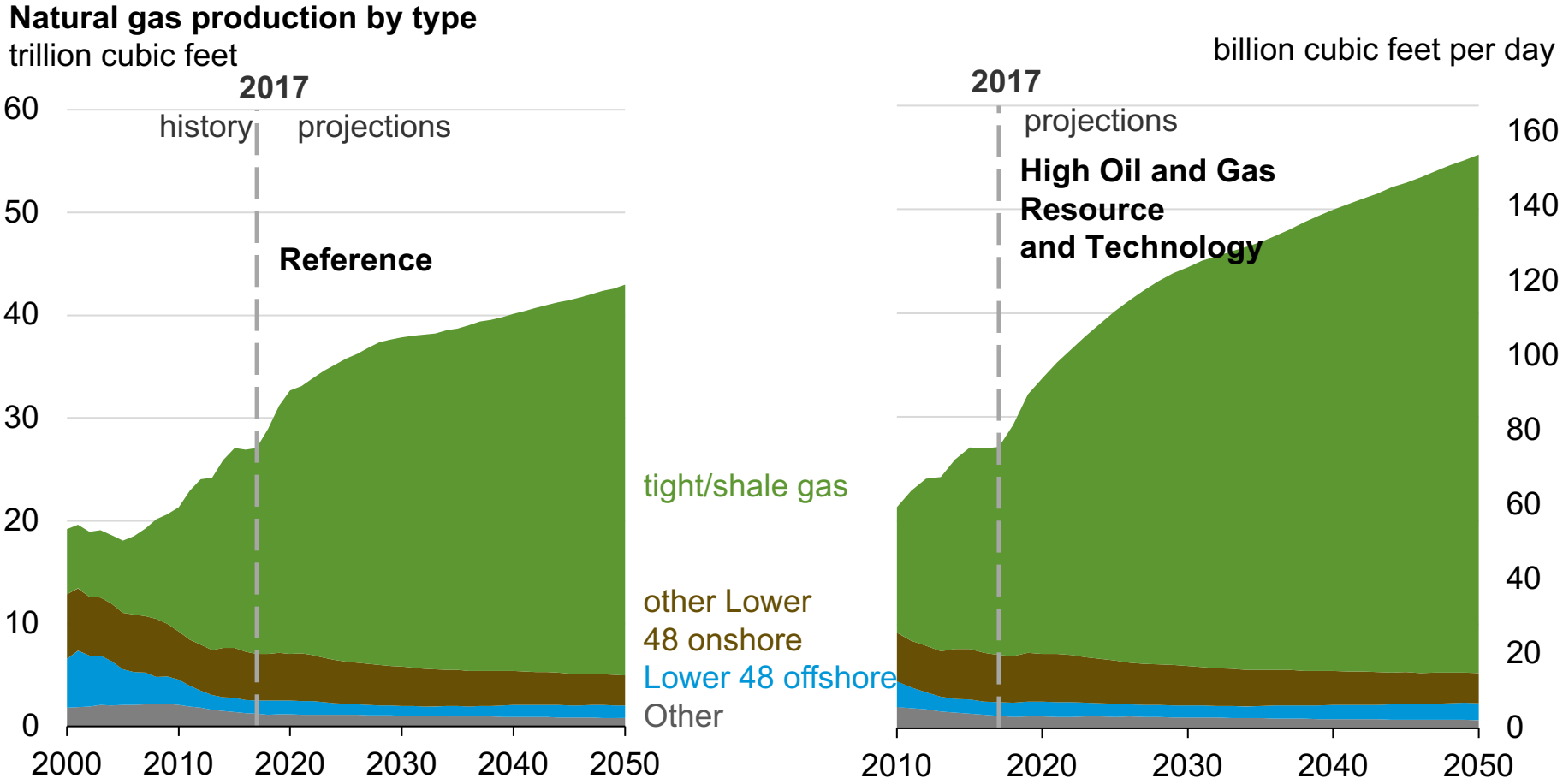


# Innovation Across the Energy Value Chain


| Expanding the supply of affordable energy | Ensuring a safe and reliable energy delivery infrastructure | Developing technology for the efficient use of energy resources |
|---|---|---|

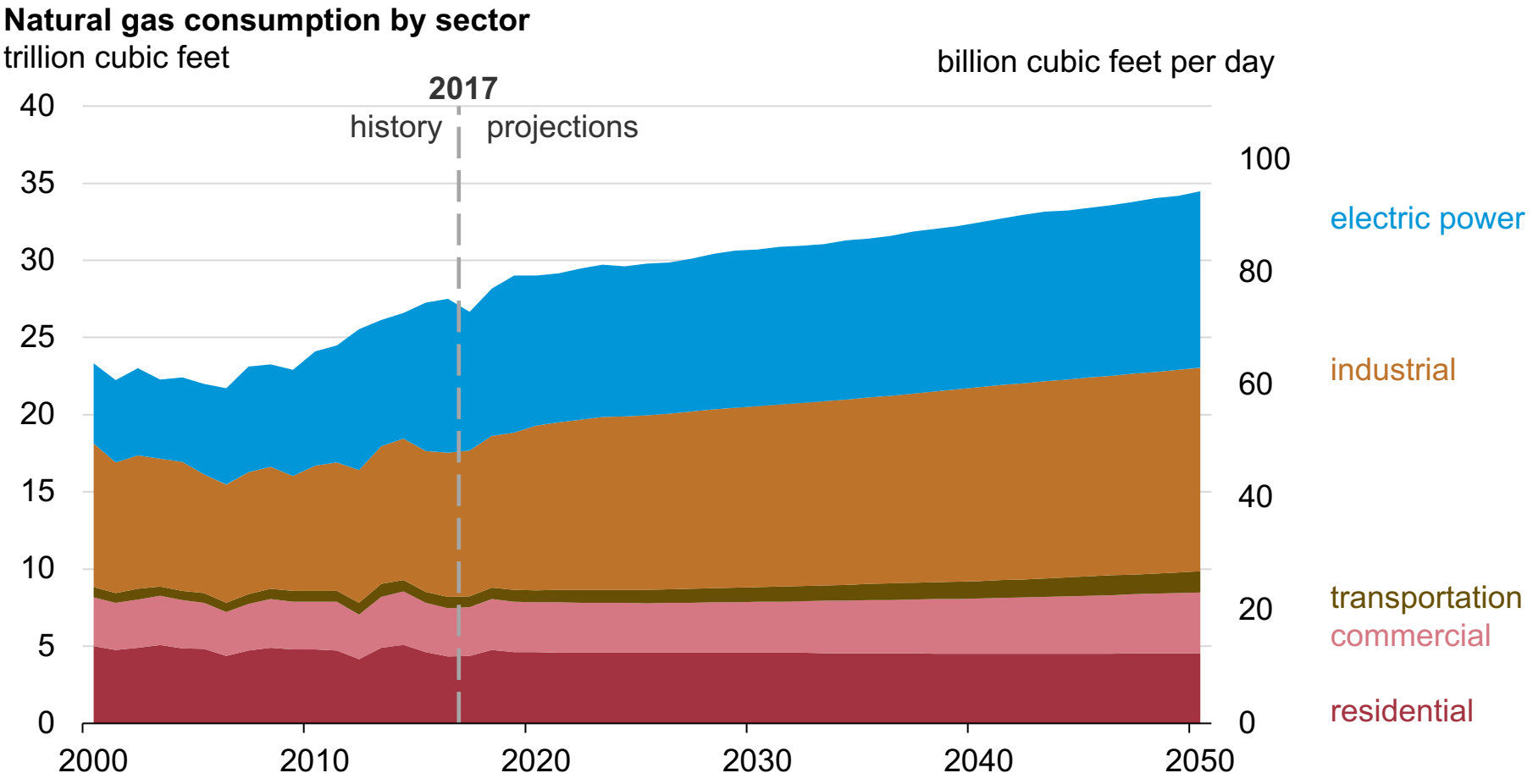
- Reducing Carbon Emissions to the Environment
- Supporting Sustainable Economic Growth

# Increased U.S. natural gas production is the result of continued development of shale gas and tight oil plays




Note: Other includes Alaska and coalbed methane

# Industrial and electric power demand drives natural gas consumption growth



# Nationwide savings

Low domestic natural gas prices have led to savings of almost $50 billion for customers who have used natural gas for heating, cooking and clothes drying over the past four years.

Natural gas:  Stable and affordable prices well into the future!

# Clean, efficient choice

Direct use, which can cut carbon emissions nearly in half, refers to natural gas consumed directly in appliances for heating and cooling, water heating, cooking and clothes drying.

*Consumers can immediately save on their monthly utility bills through converting their households to natural gas.*

## Direct use of natural gas

The direct use of natural gas in America's homes and businesses maintains about 92% of its usable energy, and a household with natural gas versus all-electric appliances produces 37% lower greenhouse gas emissions.

## Converting to electricity

Converting natural gas or any other fossil fuel into electricity to power comparable electric end-use products only maintains 32% of usable energy.

# Direct use of natural gas

## Natural gas

| SOURCE ENERGY | EXTRACTION, PROCESSING & TRANSPORTATION | GENERATION | DISTRIBUTION | DELIVERED TO CUSTOMER |
|---|---|---|---|---|
| 100 MMBtu | ▼ 7% Energy Loss<br>93 MMBtu | No energy conversion necessary, therefore no energy is lost | ▼ 1% Energy Loss<br>92 MMBtu | 92 MMBtu |

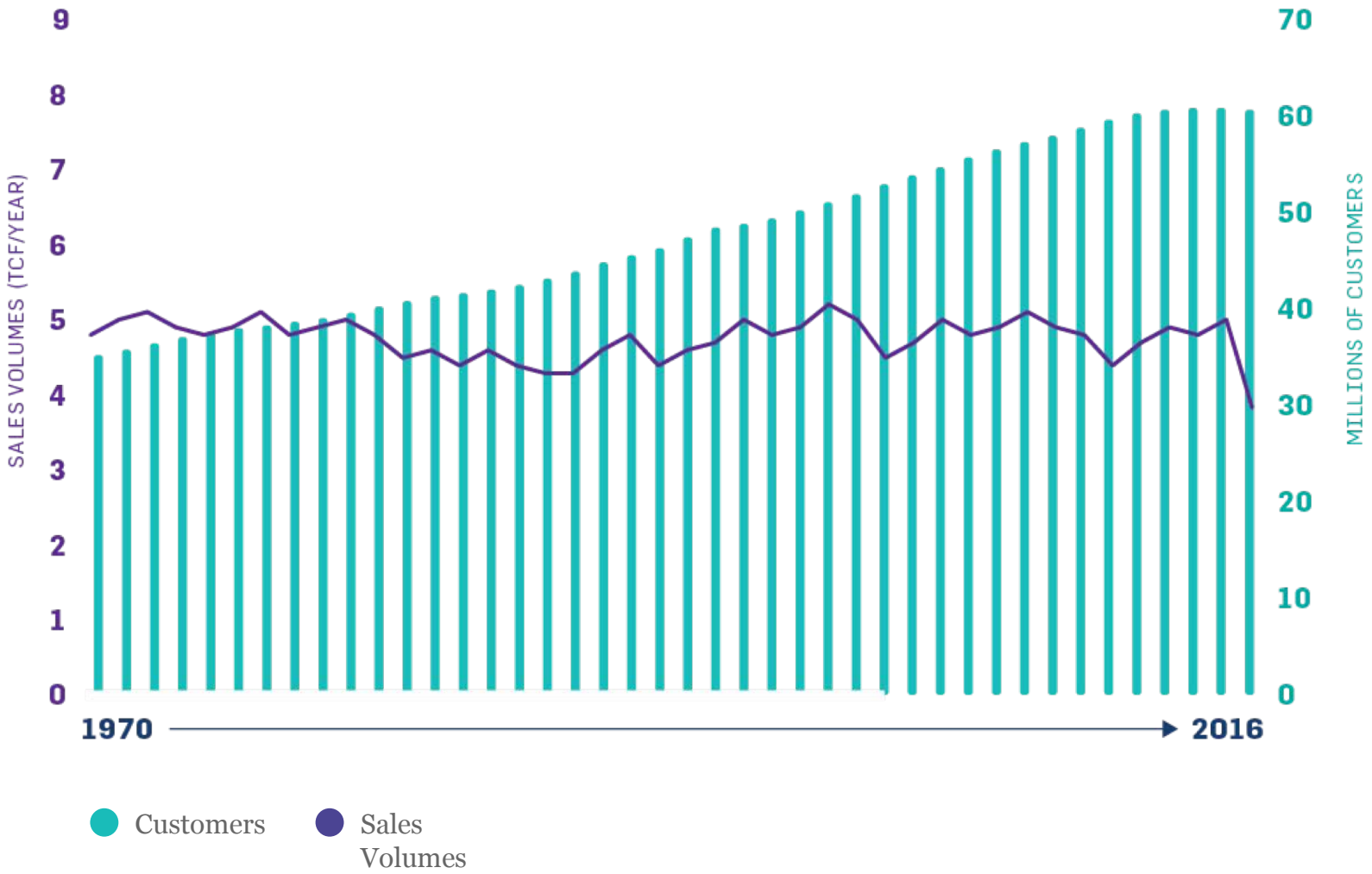
## Electricity

| SOURCE ENERGY | EXTRACTION, PROCESSING & TRANSPORTATION | GENERATION | DISTRIBUTION | DELIVERED TO CUSTOMER |
|---|---|---|---|---|
| 100 MMBtu | ▼ 5% Energy Loss<br>95 MMBtu | ▼ 64% Energy Loss<br>34 MMBtu | ▼ 6% Energy Loss<br>32 MMBtu | 32 MMBtu |

*Based on 2009 actual generation mix of all energy sources

# RESIDENTIAL NATURAL GAS USE:

## An Efficiency Success Story



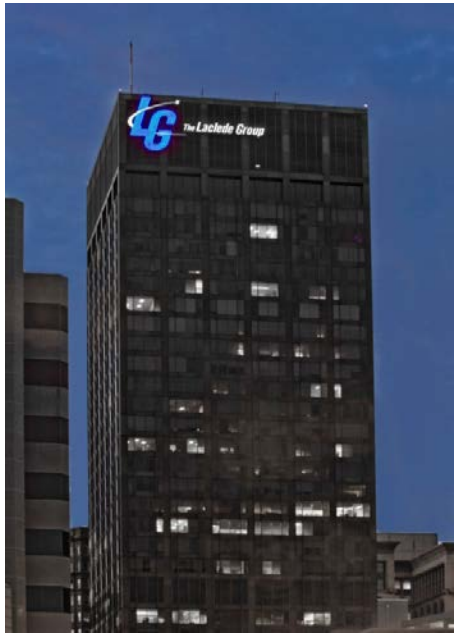
# New and emerging end-use technologies

# Combined heat and power technologies

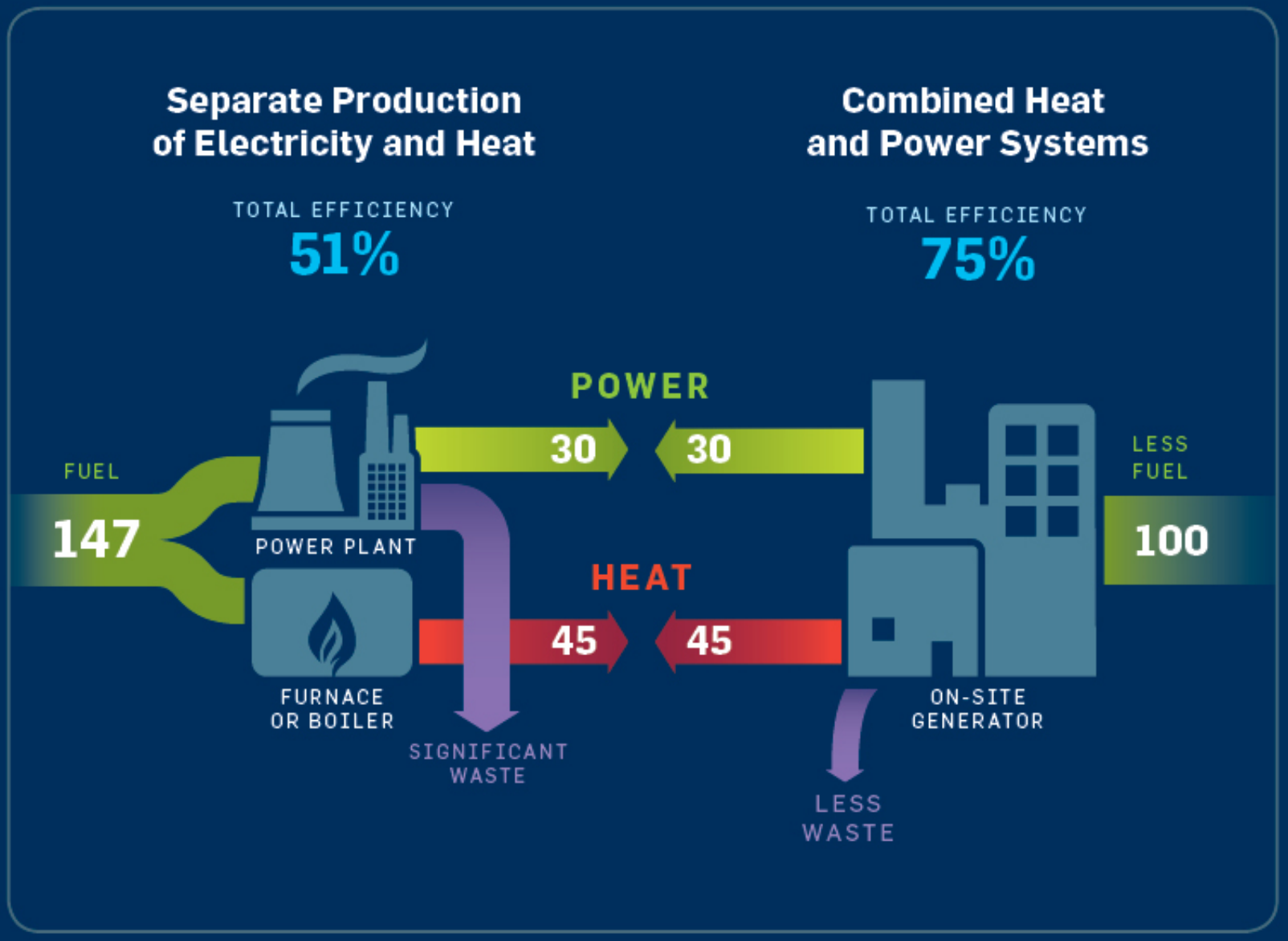
Combined heat and power (CHP) can generate electricity and capture useful heat simultaneously to increase the overall efficiency of an energy system, providing significant energy savings and carbon emissions benefits.

Natural gas is the preferred fuel choice for CHP systems that reliably serve the energy needs of commercial and industrial facilities at costs up to 50% less than traditional, separate production of electricity and heat.

**Costs**
**50%**
**Less**




*720 Olive building in St. Louis, Missouri – 4.3 MW plant*


Separate Production of Electricity and Heat
TOTAL EFFICIENCY
51%
Combined Heat and Power Systems
TOTAL EFFICIENCY
75%
POWER
30
30
FUEL
147
POWER PLANT
LESS FUEL
100
HEAT
45
45
FURNACE OR BOILER
SIGNIFICANT WASTE
ON-SITE GENERATOR
LESS WASTE

# Case study: St. Vincent's Chilton Hospital

- Located on I-65 North halfway between Birmingham and the Montgomery
- 30-bed acute care facility
- Advanced energy systems

Capstone Turbines

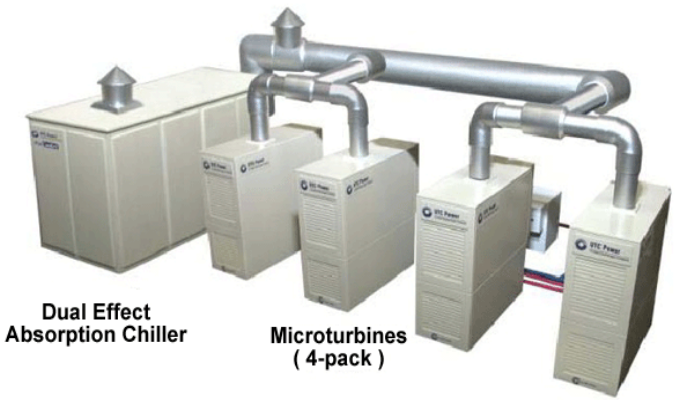
- 2 capstone turbines
- 65 kw turbine
- Power used within facility
- Turbine exhaust powers absorption chiller

Trane Thermmax Chiller

# Microturbines and fuel cells

## Microturbines

- Small, lightweight electricity generators; known for installation flexibility
- Able to serve larger loads with multiple units
- Low emissions




## Fuel Cells

- Convert hydrogen into electricity, producing recoverable heat (hot water) as a byproduct
- Produces no pollutants
- No moving parts – low noise
- Extremely high fuel efficiencies

# Transportation

Natural gas is the cleanest alternative transportation fuel available and can offer long-term cost savings, contribute to greater use of American energy and greater energy security.

Natural gas-powered vehicles produce 20% to 30% fewer tailpipe emissions than today's gasoline vehicles.

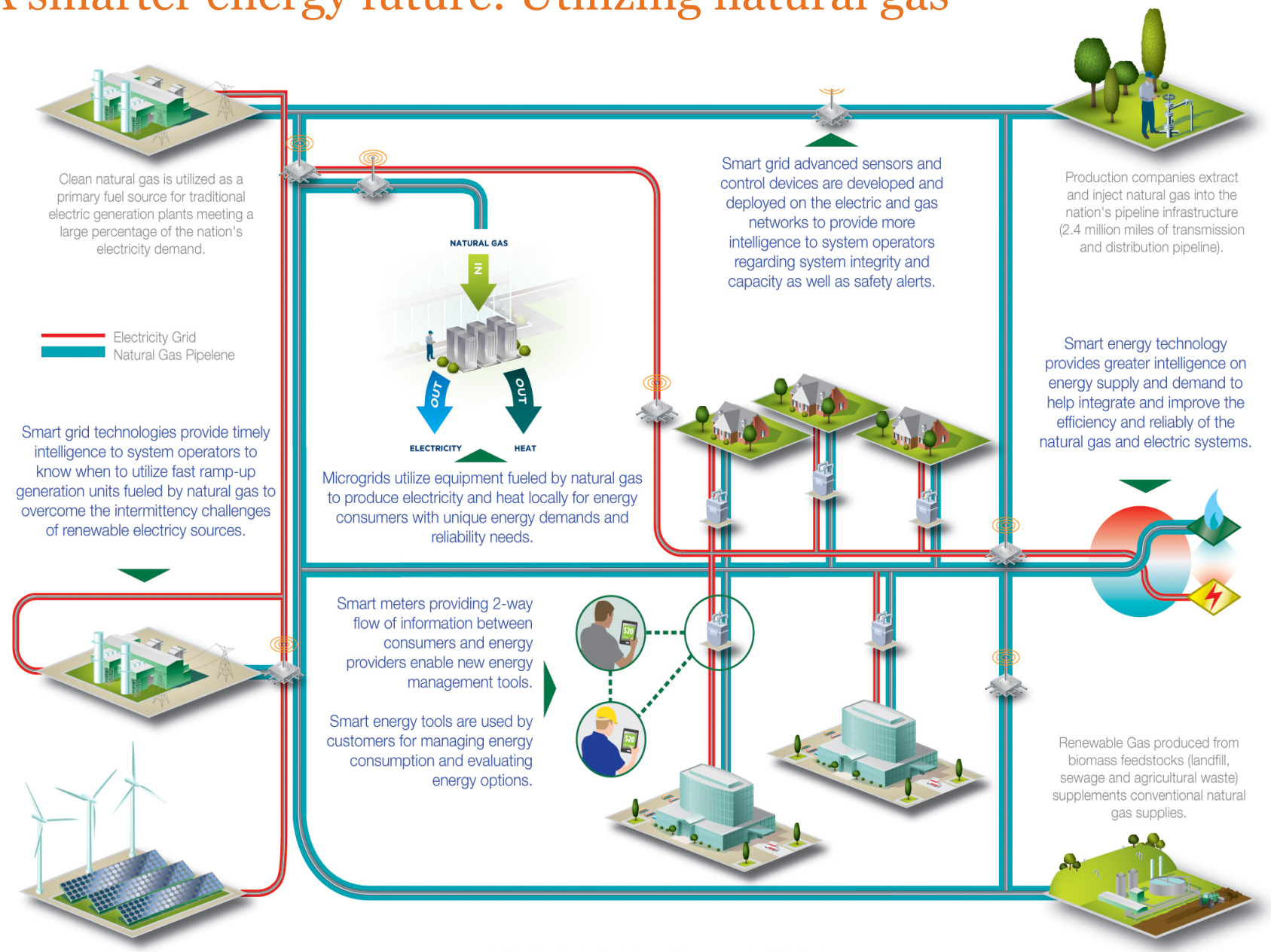
# Research and development: Natural gas end-use technologies

- Micro – Combined heat and power
  - Reciprocating engines
  - Fuel cells
- Gas-fired VRF heat pumps
- Desiccant dehumidification
- Integrated air and water rooftop units (RTUs)
- Condensing RTUs
- Hybrid gas – Solar domestic hot water
- Cambridge direct-fired heater
- Forced air combi-systems
- Gas heat pump hot water heater
- And much more …

R&D is critically important

End-use efficiency R&D and deployment will increase end-use equipment efficiency, lower first costs, enhance consumer safety

# A smarter energy future: Utilizing natural gas






EFFICIENT. SAFE. CLEAN. SECURE.

We're bringing people and energy together in ways that enrich the lives of those we serve and add value for our stakeholders.